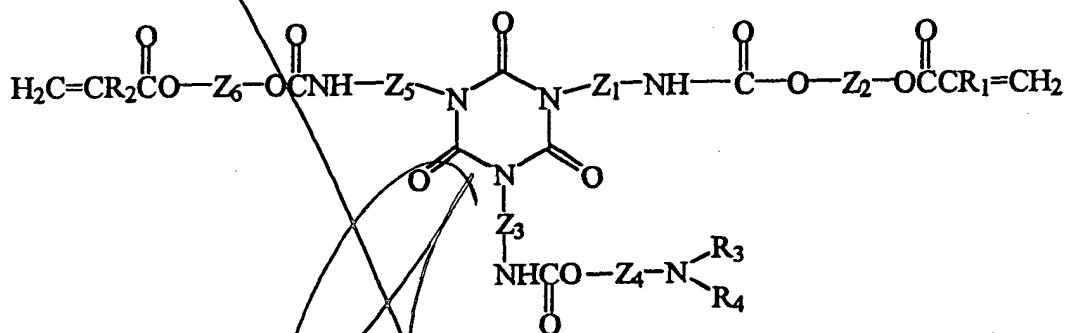


**We Claim:**

1 A monomer useful in the formulation of radiation curable coatable  
5 compositions, the monomer comprising (a) polyfunctional isocyanurate  
having at least three terminal reactive groups reacted with (b) hydroxyalkyl  
acrylate and (c) tertiary amine alcohol in a molar ratio of a:b:c of about 1:1-  
2.5:0.5-2, wherein b + c is at least 3 and no greater than the total number of  
terminal reactive groups of (a).

10 2. The monomer as defined in claim 1 comprising a compound having the  
general formula:



wherein

$\text{R}_1$  and  $\text{R}_2$  are H or  $\text{CH}_3$ ,

15  $\text{R}_3$  and  $\text{R}_4$  may independently be alkyl groups (straight, branched or  
cyclic) having from 1 to 12 carbon atoms, or  $\text{R}_3$  and  $\text{R}_4$  may  
together form a divalent cycloalkanediyl, oxacycloalkanediyl,  
or azacycloalkanediyl bridging group having from 2 to 12  
carbon atoms, and

20  $\text{Z}_1, \text{Z}_2, \text{Z}_3, \text{Z}_4, \text{Z}_5$ , and  $\text{Z}_6$  independently represent divalent groups  
having from 1 to 18 carbon atoms.

25 3. The compound of claim 2 wherein the divalent groups  $\text{Z}_1, \text{Z}_2, \text{Z}_3, \text{Z}_4, \text{Z}_5$ , and  
 $\text{Z}_6$  comprise alkanediyl groups (straight, branched or cyclic) having from 1  
to 18 carbon atoms.

4. The compound of claim 3 wherein the alkanediyl groups are straight chain alkanediyl groups having from 1 to 4 carbon atoms.
5. A radiation curable coatable composition, comprising:
- (a) a first monomer comprising the monomer of claim 1;
  - (b) a second monomer; and
  - (c) photoinitiator.
6. The coatable composition as defined in claim 5 wherein the first monomer is present within the composition in an amount between about 10% and about 90 % by weight.
7. The coatable composition as defined in claim 5 wherein the second monomer comprises an acrylate material.
8. The coatable composition as defined in claim 7 wherein the acrylate material is selected from the group consisting of monofunctional acrylates, difunctional acrylates, trifunctional acrylates, higher acrylates and combinations of the foregoing.
9. The coatable composition as defined in claim 8 wherein the monofunctional acrylates are selected from the group consisting of tetrahydrofurfuryl acrylate, cyclohexyl acrylate, *n*-hexyl acrylate, 2-ethoxyethyl acrylate, isodecyl acrylate, 2-methoxyethyl acrylate, 2-(2-ethoxyethoxy)ethyl acrylate, stearyl acrylate, lauryl acrylate, octyl acrylate, 2-phenoxyethyl acrylate, glycidyl acrylate, isobornyl acrylate, benzyl acrylate, tridecyl acrylate, caprolactone acrylate, ethoxylated nonylphenol acrylate, polypropylene glycol acrylate, and combinations of the foregoing.

10. The coatable composition as defined in claim 8 wherein the difunctional acrylates are selected from the group consisting of triethylene glycol diacrylate, ethylene glycol diacrylate, tetraethylene glycol diacrylate, polyethylene glycol diacrylate, 1,3-butylene glycol diacrylate, 1,4-butanediol diacrylate, diethylene glycol diacrylate, hexanediol diacrylate, neopentyl glycol diacrylate, tripropylene glycol diacrylate, ethoxylated bisphenol A diacrylate, propoxylated neopentyl glycol diacrylate, and combinations of the foregoing.
11. The coatable composition as defined in claim 8 wherein the trifunctional acrylates are selected from the group consisting of trimethylolpropane triacrylate, tris(2-hydroxyethyl)isocyanurate triacrylate, ethoxylated trimethylolpropane triacrylate, pentaerythritol triacrylate, propoxylated trimethylolpropane triacrylate, propoxylated glyceryl triacrylate, and combinations of the foregoing.
12. The coatable composition as defined in claim 8 wherein the higher acrylates are selected from the group consisting of pentaerythritol tetraacrylate, ditrimethylolpropane tetraacrylate, ethoxylated pentaerythritol tetraacrylate, and the like; metallic acrylates such as zinc diacrylate, calcium diacrylate and combinations of the foregoing.
13. The coatable composition as defined in claim 7 wherein the acrylate material is selected from the group consisting of acrylated oligomers, acrylated polymers, acrylated silicones and combinations of the foregoing.
14. The coatable composition as defined in claim 13 wherein the acrylated polymer is selected from the group consisting of polyurethane monoacrylates, polyurethane polyacrylates, polyester monoacrylates, polyester polyacrylates, polyamide monoacrylates, polyamide polyacrylates,

polybutadiene monoacrylates, polybutadiene polyacrylates, and combinations of the foregoing.

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15. The coatable composition as defined in claim 5 wherein the second monomer is present within the composition in an amount between about 5% and about 90% by weight.
- 10
16. The coatable composition as defined in claim 5 wherein the photoinitiator comprises benzophenone in an amount between about 2% and about 10% by weight.
17. The coatable composition of claim 5 further comprising silica particles modified with 3-mercaptopropyltrimethoxysilane.
- 15
18. A coating derived from the coatable composition of claim 5.
19. A floor finishing system comprising:  
the coatable composition of claim 5; and  
a primer composition.
- 20
20. The floor finishing system as defined in claim 19 wherein the primer comprises an acrylated latex having a solids content between about 2 and about 40% by weight.
- 25
21. A method for applying a protective coating to a substrate, comprising:  
(A) applying a radiation curable coatable composition to a substrate, the composition comprising  
(i) a first monomer comprising (a) polyfunctional isocyanurate having at least three terminal reactive groups reacted with (b) hydroxyalkyl acrylate and (c) tertiary amine alcohol in a molar ratio
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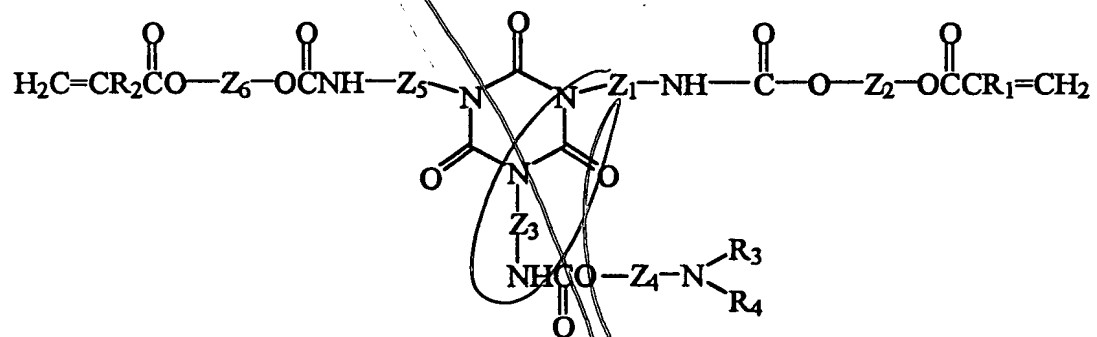
of a:b:c of about 1:1-2.5:0.5-2, wherein b + c is at least 3 and no greater than the total number of terminal reactive groups of (a),

(ii) a second monomer comprising a radiation curable material, and

(iii) photoinitiator; and

(B) hardening the composition to form a protective coating over the substrate by exposing the coatable composition to ultraviolet radiation.

22. The method as defined in claim 21 wherein the first monomer comprises a compound having the general formula



R<sub>1</sub> and R<sub>2</sub> are H or CH<sub>3</sub>,

R<sub>3</sub> and R<sub>4</sub> may independently be alkyl groups (straight, branched or cyclic) having from 1 to 12 carbon atoms, or R<sub>3</sub> and R<sub>4</sub> may together form a divalent cycloalkanediyl, oxacycloalkanediyl, or azacycloalkanediyl bridging group having from 2 to 12 carbon atoms, and

Z<sub>1</sub>, Z<sub>2</sub>, Z<sub>3</sub>, Z<sub>4</sub>, Z<sub>5</sub>, and Z<sub>6</sub> independently represent divalent groups having from 1 to 18 carbon atoms.

23. The method as defined in claim 21 further comprising, before step (A), applying a primer composition to the floor and drying the primer composition to form a primer coat over the substrate.

24. The method as defined in claim 23 wherein the primer composition comprises an acrylated latex having a solids content between about 2 and about 40% by weight.
- 5 25. The method as defined in claim 21 further comprising, before step (A), preparing the first monomer by reacting a polyfunctional isocyanurate with a tertiary amine alcohol and at least one hydroxyalkyl acrylate.
- 10 26. The method as defined in claim 25 wherein the polyfunctional isocyanurate is a trimer of hexamethylene diisocyanate or an allophanated trimer derived from the reaction of hexamethylene diisocyanate and butanol.
- 15 27. The method as defined in claim 25 wherein the tertiary amine alcohol is selected from the group consisting of acyclic tertiary dialkylamino alcohols having from 3 to 30 carbon atoms, alicyclic tertiary amino alcohols having from 3 to 30 carbon atoms, polyaminoalcohols having from 3 to 30 carbon atoms, aromatic amine alcohols and combinations of the foregoing.
- 20 28. The method as defined in claim 27, wherein the acyclic tertiary dialkylamino alcohols having from 3 to 30 carbon atoms is selected from the group consisting of *N,N*-dimethylaminoethanol, *N,N*-dimethylaminopropanol, *N,N*-dimethylaminobutanol, *N,N*-dimethylaminohexanol, *N,N*-dimethylaminododecanol, *N,N*-diethylaminoethanol, *N,N*-diethylaminopropanol, *N,N*-diethylaminobutanol, *N*-ethyl-*N*-methylaminopropanol, *N*-ethyl-*N*-hexylaminoethanol, and combinations of the foregoing.
- 25 28. The method as defined in claim 27, wherein the alicyclic tertiary amino alcohols having from 3 to 30 carbon atoms are selected from the group consisting of 2-aziridinylethanol, 2-azetidinyethanol, 2-piperidinoethanol, *N*-methyl-4-azacyclohexanol, and combinations of the foregoing.
- 30

30. The method as defined in claim 27, wherein the polyaminoalcohols having from 3 to 30 carbon atoms are selected from the group consisting of *N*-methylpiperazinoethanol, *N*-butylpiperazinoethanol, *N*-methylpiperazinobutanol, and combinations of the foregoing.
31. The method as defined in claim 25 wherein the hydroxyalkyl acrylate is 2-hydroxyethyl acrylate.
32. The method as defined in claim 21 wherein the second monomer comprises an acrylate material.
33. The method as defined in claim 32 wherein the acrylate material is selected from the group consisting of monofunctional acrylates, difunctional acrylates, trifunctional acrylates, higher acrylates and combinations of the foregoing.
34. The method as defined in claim 33 wherein the monofunctional acrylates are selected from the group consisting of tetrahydrofurfuryl acrylate, cyclohexyl acrylate, *n*-hexyl acrylate, 2-ethoxyethyl acrylate, isodecyl acrylate, 2-methoxyethyl acrylate, 2-(2-ethoxyethoxy)ethyl acrylate, stearyl acrylate, lauryl acrylate, octyl acrylate, 2-phenoxyethyl acrylate, glycidyl acrylate, isobornyl acrylate, benzyl acrylate, tridecyl acrylate, caprolactone acrylate, ethoxylated nonylphenol acrylate, polypropylene glycol acrylate, and combinations of the foregoing.
35. The method as defined in claim 33 wherein the difunctional acrylates are selected from the group consisting of triethylene glycol diacrylate, ethylene glycol diacrylate, tetraethylene glycol diacrylate, polyethylene glycol diacrylate, 1,3-butylene glycol diacrylate, 1,4-butanediol diacrylate, diethylene glycol diacrylate, hexanediol diacrylate, neopentyl glycol

diacrylate, tripropylene glycol diacrylate, ethoxylated bisphenol A diacrylate, propoxylated neopentyl glycol diacrylate, and combinations of the foregoing.

- 5 36. The method as defined in claim 33 wherein the trifunctional acrylates are selected from the group consisting of trimethylolpropane triacrylate, tris(2-hydroxyethyl)isocyanurate triacrylate, ethoxylated trimethylolpropane triacrylate, pentaerythritol triacrylate, propoxylated trimethylolpropane triacrylate, propoxylated glyceryl triacrylate, and combinations of the  
10 foregoing.
37. The method as defined in claim 33 wherein the higher acrylates are selected from the group consisting of pentaerythritol tetraacrylate, ditrimethylolpropane tetraacrylate, ethoxylated pentaerythritol tetraacrylate,  
15 and the like; metallic acrylates such as zinc diacrylate, calcium diacrylate and combinations of the foregoing.
38. The method as defined in claim 32 wherein the acrylate material is selected from the group consisting of acrylated oligomer, acrylated polymer,  
20 acrylated silicone and combinations of the foregoing.
39. The method as defined in claim 38 wherein the acrylated polymer is selected from the group consisting of polyurethane monoacrylates, polyurethane polyacrylates, polyester monoacrylates, polyester polyacrylates, polyamide  
25 monoacrylates, polyamide polyacrylates, polybutadiene monoacrylates, polybutadiene polyacrylates, and combinations of the foregoing.
40. The method as defined in claim 21 wherein the second monomer is present within the coatable composition in an amount between about 5% and about  
30 90% by weight.



41. The method as defined in claim 21 wherein the photoinitiator comprises benzophenone combined with a carbazole derivative, the photoinitiator present in the composition in an amount between about 2% and about 10 % by weight.
- 5
42. The method as defined in claim 21 wherein hardening of the composition comprises exposing the composition to ultraviolet radiation for a period of less than about 30 seconds.
- 10
43. The method as defined in claim 42 wherein the ultraviolet radiation comprises a first band of wavelengths less than about 300 nm and a second band of wavelengths between about 300 and 400 nm and wherein the ultraviolet radiation is emitted from a source at an intensity of between about 5 and about 15 mW/cm<sup>2</sup>.
- 15
44. A substrate treated according to the method of claim 21.

Add B1